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APPLICATION FOR PATENT

ON

AIR COMPRESSOR ASSEMBLY HAVING ENCLOSED UNPAINTED AIR TANK

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AIR COMPRESSOR ASSEMBLY HAVING ENCLOSED UNPAINTED AIR TANK

CROSS-REFERENCE TO RELATED DOCUMENTS

[0001] The present application claims the benefit under 35 U.S.C. § 119(e) of U.S. Provisional Application Serial No. 60/408,860, filed September 6, 2002. Said U.S. Provisional Application Serial No. 60/408,860 is herein incorporated by reference in its entirety.

[0002] The present application herein incorporates the following United States Patent Applications by reference in their entirety:

Attorney Docket Number	"Express Mail" Mailing Label No.	Filing Date
PTG 02-96-2	EV 338 284 628 US	June 20, 2003
PTG 02-96-4	EV 338 284 605 US	June 20, 2003

FIELD OF THE INVENTION

[0003] The present invention relates generally to the field of air compressors, and particularly to an air compressor assembly having an unpainted air tank which is enclosed in a shroud.

BACKGROUND OF THE INVENTION

[0004] The supply of compressed air is an important consideration in human life. From residential use to industrial application, compressed air is utilized to perform many operations such as powering air tools and sprayers. Since the air tank of a conventional air compressor assembly is generally visible to a user, manufacturers typically have to paint the outside surface of the air tank in color that satisfies the aesthetic requirement of their customers. Different customers may like different color, and painting the air tank is an expensive and time-consuming process. Thus the process of painting the air tank may greatly decrease the manufacturing efficiency

and increase the manufacturing cost. Moreover, because a conventional air tank is generally exposed to the outside air, it is easy for the air tank to dissipate heat and thus for the moisture within the compressed air inside the tank to condense, which may cause tank corrosion. Furthermore, during air usage because an operator may be in direct contact with potentially hot tubing surfaces of the air compressor assembly, operator burn injuries may result.

[0005] Thus, it would be desirable to provide an air compressor assembly that reduces the risk of operator burn injuries and has less tank corrosion, and whose manufacturing process does not require the air tank be painted.

SUMMARY OF THE INVENTION

[0006] Accordingly, the present invention is directed to an air compressor assembly having an unpainted air tank that is enclosed in a shroud. The air tank may be made of steel, plastic, or the like. In a preferable embodiment, the shroud is made of plastic. The shroud may also be made of metal or the like.

[0007] According to the present invention, the air tank need not be painted during the manufacturing process, because the air tank is enclosed in the shroud and is thus normally hidden from an outside viewer. An unpainted hidden tank may increase the manufacturing efficiency and lower the cost. In the meantime, an unpainted hidden tank does not adversely affect customers' aesthetic requirement since the tank is typically hidden from the customers.

[0008] Moreover, the air compressor assembly enclosed in a shroud may reduce the risk of operator burn injuries from potentially hot tubing surfaces of the air compressor assembly during air usage, because the operator is not in direct contact with the surfaces.

[0009] Furthermore, the air tank enclosed in a shroud may warm up more quickly than an exposed tank by absorbing heat from the air compressor assembly. The air tank also retains heat longer because of reduced convection and radiation cooling to the outside air. By keeping the air tank warmer, the moisture within the compressed air in the air tank is less likely to condense, resulting in reduced tank corrosion.

[0010] The air compressor assembly according to the present invention may be formed in various styles, including a "pancake" type air compressor assembly, a "hot-dog" type air compressor assembly, a vertical "hot-dog" type air compressor assembly, a vertical stationary type air compressor assembly, a "double hot-dog" type air compressor assembly, and the like.

[0011] It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the invention as claimed. The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate an embodiment of the invention and together with the general description, serve to explain the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The numerous advantages of the present invention may be better understood by those skilled in the art by reference to the accompanying figures in which:

FIG. 1 is an isometric view illustrating a portable air compressor assembly in accordance with an exemplary embodiment of the present invention;

FIG. 2 is a front elevation view of the portable air compressor assembly shown in FIG. 1;

FIG. 3 is a side elevation view of the portable air compressor assembly shown in FIG. 1;

FIG. 4 is an isometric view of an exemplary embodiment of the portable air compressor assembly shown in FIGS. 1 through 3, wherein a front shell of a shroud is removed for illustration of an air tank, an air compressor and a manifold assembly;

FIG. 4A is an isometric view of a further exemplary embodiment of the portable air compressor assembly shown in FIGS. 1 through 3, wherein a front shell of a shroud is removed for illustration of an air tank, an air compressor and a manifold assembly;

FIG. 5A shows an exemplary conventional "pancake" type air compressor assembly;

FIG. 5B shows an exemplary "pancake" type air compressor assembly in accordance with the present invention, wherein the air compressor assembly shown in FIG. 5A is enclosed in a shroud;

FIG. 6A shows an exemplary conventional "hot-dog" type air compressor assembly;

FIG. 6B shows an exemplary "hot-dog" type air compressor assembly in accordance with the present invention, wherein the air compressor assembly shown in FIG. 6A is enclosed in a shroud;

FIG. 7A shows an exemplary conventional vertical "hot-dog" type air compressor assembly;

FIG. 7B shows an exemplary vertical "hot-dog" type air compressor assembly in accordance with the present invention, wherein the air compressor assembly shown in FIG. 7A is enclosed in a shroud;

FIG. 8A shows an exemplary conventional vertical stationary type air compressor assembly; and

FIG. 8B shows an exemplary vertical stationary type air compressor assembly in accordance with the present invention, wherein the air compressor assembly shown in FIG. 8A is enclosed in a shroud.

DETAILED DESCRIPTION OF THE INVENTION

[0013] Reference will now be made in detail to the presently preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings.

[0014] Referring generally to FIGS. 1 through 4, exemplary embodiments of a portable air compressor assembly 100 in accordance with the present invention are shown. The portable air compressor assembly 100 may include an air tank 102, an air compressor 104, and a manifold assembly 106 assembled within a shroud or housing 108. The shroud 108 may be made of plastic, metal, or the like. The shroud 108, which is preferably made of plastic, includes a handle 118 allowing an operator to lift and transport the portable air compressor assembly 100 from place to place, and a control panel 120 providing controls for the portable air compressor assembly 100. In the exemplary embodiments illustrated, the control panel 120 may include an on/off switch 122, a pressure regulator 124, a pressure gauge 126, a pressure relief safety valve 128, and the speed control switch 116. However, it will be appreciated that the control panel 120 may provide other controls depending on design preferences.

[0015] As shown in FIGS. 4 and 4A, the air compressor 104 may include a compressor 110 having one or more pistons 112 driven by a motor or engine 114. For example, in the exemplary embodiment illustrated, the air compressor 104 may include a single piston compressor 110 having a single piston driven by a universal electric motor 114. By employing a universal electric motor 114, the speed at which the motor 114 operates, and thus the speed at which the piston 112 is reciprocated, may be varied by controlling the voltage supplied to the motor 114. In this manner, the air flow rate supplied by the air compressor 104 to the air tank 102 may be varied. For example, in the embodiments illustrated in FIGS. 1 through 4, a speed control switch 116 is provided, which allows an operator to select between a high speed operation mode wherein maximum air flow is supplied to the air tank 102 and a low

speed operating mode wherein the compressor 110 runs more slowly reducing the noise generated by the air compressor 104.

[0016] FIG. 4 shows an exemplary embodiment of the portable air compressor assembly 100 shown in FIGS. 1 through 3, wherein a front shell of the shroud 108 is removed for illustration of the air tank 102, the air compressor 104 and the manifold assembly 106. The tank 102 may be made of metal, plastic, and the like and its outer surface was not painted during the manufacturing process. The air tank 102 has an air inlet port 130 and an air outlet port 132, both positioned at the wall of the air tank 102. In the exemplary embodiment shown in FIG. 4, the air inlet port 130 is located at an upper wall of the air tank 102, and the air outlet port 132 is located at a lower wall of the air tank 102. It is understood that the locations of the air inlet port 130 and the air outlet port 132 at the wall of the air tank 102 may change without departing from the scope and spirit of the present invention. The air inlet port 130 and the air outlet port 132 are openings extending through the wall of the air tank 102.

[0017] As shown in FIG. 4, the air compressor 104 may provide air to the air tank 102 through the tubing 136 and the air inlet port 130. There may exist a check valve (not shown) inside the air inlet port 130, which allows air to flow from the air compressor 104 to the air tank 102 but prevents air from flowing from the air tank 102 to the air compressor 104. The air tank 102 may be connected to the manifold assembly 106 through tubing 134. During air usage, compressed air being released from the air tank 102, because of its high pressure, may drive condensate accumulated in the tank 102 out through the air outlet port 132. The compressed air being released may mix with the discharged condensate and be used in air powered tools. Preferably, the discharged condensate is routed through the tubing 134, the manifold assembly 106 and any attached air hose to the air powered tools.

[0018] FIG. 4A shows a further exemplary embodiment of the portable air compressor assembly 100 shown in FIGS. 1 through 3, wherein a front shell of the shroud 108 is removed for illustration of the air tank 102, the air compressor 104 and the manifold assembly 106. The tank 102 may be made of metal, plastic, and the like and its outer surface was not painted during the manufacturing process. The air tank 102 has an air access port 132 positioned at the wall of the air tank 102. In the exemplary embodiment shown in FIG. 4A, the air access port 132 is located at a lower wall of the air tank 102. It is understood that the location of the air access port 132 at the wall of the air tank 102 may change without departing from the scope and spirit of the present invention. The air access port 132 is an opening extending through the wall of the air tank 102.

[0019] As shown in FIG. 4A, the air compressor 104 is connected to the manifold assembly 106 through the tubing 136, and the air tank 102 is connected to the manifold assembly 106 through the air access port 132 and tubing 134. There may exist a check valve (not shown) inside the manifold assembly 106, which allows air to flow from the air compressor 104 to the manifold assembly 106 but prevents air from flowing from the manifold assembly 106 to the air compressor 104. Thus, the air compressor 104 may supply air to the air tank 102 through the tubing 136, the manifold assembly 106, the tubing 134 and the air access port 132. Compressed air may be released from the air tank 102 through the air access port 132, the tubing 134, the manifold assembly 106, and any attached air hose to the air powered tools. During air usage, compressed air being released from the air tank 102, because of its high pressure, may drive condensate accumulated in the tank 102 out through the air access port 132. The compressed air being released may mix with the discharged condensate and be used in air powered tools.

[0020] In the exemplary embodiments illustrated in FIGS. 4 and 4A, the air tank 102 is enclosed within and supported by the shroud 108. The shroud 108 also encloses

the air compressor 104, the manifold assembly 106, the tubing 134, the tubing 136, and electrical wiring. Because the air tank 102 is normally invisible to viewers of the shroud 108 from outside of the assembled shroud, the air tank 102 may be fabricated and assembled into the unit without first being painted. In this manner, processing through an expensive and time consuming painting process is eliminated, improving manufacturing efficiencies to lower cost. Moreover, all potentially hot tubing 136 between the air compressor 104 and the air tank 102 is enclosed, thereby reducing the risk of operator burn injuries from hot surfaces. An additional advantage of the enclosed air tank 102 is that the air tank 102 may warm up more quickly than an exposed tank by absorbing heat from the air compressor 104. The air tank 102 also retains heat longer because of reduced convection and radiation cooling to the outside air. By keeping the air tank 102 warmer, the tank 102 is less likely to condense moisture, resulting in reduced tank corrosion.

[0021] It is understood that the portable air compressor assembly 100 in accordance with the present invention may have other configurations without departing from the scope and spirit of the present invention. For example, the unpainted enclosed air tank 102 may have at the tank bottom a conventional drain valve instead of the automatic drain device (e.g., the air outlet port 132 and the tubing 134) to drain the condensate in the tank 102. Moreover, the portable air compressor assembly 100 may have the configuration shown in FIGS. 8 and 9 of co-pending U.S. Patent Application ("Express Mail" Mailing Label No. EV 338 284 628 US, filed June 20, 2003), wherein the air tank was not painted during the manufacturing process. The portable air compressor assembly 100 may also be partially enclosed. For example, a shroud may enclose the unpainted air tank 102 only and thus hide the air tank 102 from an outside viewer, while the air compressor 104 and the manifold assembly 106 may be exposed to the air. It is understood that a portable air compressor assembly means an air compressor assembly that can be carried and/or moved with ease, and not as a structural limitation.

[0022] Referring generally now to FIGS. 5 through 8, exemplary air compressor assemblies in various styles in accordance with the present invention are shown. Referring to FIG. 5A, an exemplary conventional "pancake" type air compressor assembly 500 is shown. The air compressor assembly 500 may include an air tank 502 for storing compressed air, an air compressor 512 for supplying compressed air to the air tank 502, and piping or tubing 514. The air tank 502 is a flattened oval tank, often referred to informally in the art as a "pancake" style tank. The air tank 502 may be made of plastic, metal such as steel, or the like and was painted to satisfy customers' aesthetic requirements during the manufacturing process. The air tank 502 is directly exposed to the outside air. The air compressor assembly 500 may also include a wheel assembly 504 for transporting the air compressor assembly 500, and a control panel 510 allowing an operator to control the air compressor assembly 500.

[0023] FIG. 5B shows an exemplary "pancake" type air compressor assembly 550 in accordance with the present invention. Here, the air compressor assembly 500 shown in FIG. 5A, including the air tank 502, the air compressor 512 and the connecting piping or tubing 514, is enclosed in a shroud 508. However, the outer surface of the air tank 502 was not painted during the manufacturing process. The shroud 508 may be made of metal such as steel, plastic, or the like. The wheel assembly 504 of the air compressor assembly 500 is not enclosed so that the air compressor assembly 550 may be easily transported. And the control panel 510 is also not enclosed so that the air compressor assembly 550 may be controlled from outside by an operator.

[0024] Referring to FIG. 6A, an exemplary conventional "hot-dog" type air compressor assembly 600 is shown. The air compressor assembly 600 may include an air tank 602 for storing compressed air, an air compressor 612 for supplying compressed air to the air tank 602, and piping or tubing 614. The air tank 602 is a horizontally disposed, cylindrical compressed air tank, typically referred to

informally in the art as a "hot-dog" style tank. The air tank 602 may be made of plastic, metal such as steel or the like and was painted to satisfy customers' aesthetic requirement during the manufacturing process. The air tank 602 is directly exposed to the outside air. The air compressor assembly 600 may also include a wheel assembly 604 and a handle assembly 606 for transporting the air compressor assembly 600, and a control panel 610 allowing an operator to control the air compressor assembly 600.

[0025] FIG. 6B shows an exemplary "hot-dog" type air compressor assembly 650 in accordance with the present invention. Here, the air compressor assembly 600 shown in FIG. 6A, including the air tank 602, the air compressor 612 and the connecting piping or tubing 614, is enclosed in a shroud 608. However, the outer surface of the air tank 602 was not painted during the manufacturing process. The shroud 608 may be made of metal such as steel, plastic, or the like. The wheel assembly 604 and the handle assembly 606 of the air compressor assembly 600 are not enclosed so that the air compressor assembly 650 may be easily transported. And the control panel 610 is also not enclosed so that the air compressor assembly 650 may be controlled from outside by an operator.

[0026] Referring to FIG. 7A, an exemplary conventional vertical "hot-dog" type air compressor assembly 700 is shown. The air compressor assembly 700 may include an air tank 702 for storing compressed air, an air compressor 712 for supplying compressed air to the air tank 702, and piping or tubing 714. The air tank 702 is a vertically disposed, cylindrical compressed air tank, typically referred to informally in the art as a vertical "hot-dog" style tank. The air tank 702 may be made of plastic, metal such as steel, or the like and was painted according to customers' aesthetic requirement during the manufacturing process. The air tank 702 is directly exposed to the outside air. The air compressor assembly 700 may also include a wheel assembly 704 and a handle assembly 706 for transporting the air compressor

assembly 700, and a control panel 710 allowing an operator to control the air compressor assembly 700.

[0027] FIG. 7B shows an exemplary vertical "hot-dog" type air compressor assembly 750 in accordance with the present invention. Here, the air compressor assembly 700 shown in FIG. 7A, including the air tank 702, the air compressor 712 and the connecting piping or tubing 714, is enclosed in a shroud 708. However, the outer surface of the air tank 702 was not painted during the manufacturing process. The shroud 708 may be made of metal such as steel, plastic, or the like. The wheel assembly 704 and the handle assembly 706 of the air compressor assembly 700 are not enclosed so that the air compressor assembly 750 may be easily transported. And the control panel 710 is also not enclosed so that the air compressor assembly 750 may be controlled from outside by a user.

[0028] Referring to FIG. 8A, an exemplary conventional vertical stationary type air compressor assembly 800 is shown. The air compressor assembly 800 may include an air tank 802 for storing compressed air, an air compressor 812 for supplying compressed air to the air tank 802, and piping or tubing 814. The vertically disposed air tank 802 may be made of plastic, metal such as steel, or the like and was painted to satisfy customers' aesthetic requirement during the manufacturing process. The air tank 802 is directly exposed to the outside air. The air compressor assembly 800 is stationary, that is, it may not be easily transported. The air compressor assembly 800 may include a control panel 810, allowing an operator to control the air compressor assembly 800.

[0029] FIG. 8B shows an exemplary vertical stationary type air compressor assembly 850 in accordance with the present invention. Here, the air compressor assembly 800 shown in FIG. 8A, including the air tank 802, the air compressor 812 and the connecting piping or tubing 814, is enclosed in a shroud 808. However, the outer

surface of the air tank 802 was not painted during the manufacturing process. The shroud 808 may be made of metal such as steel, plastic, or the like. The control panel 810 is not enclosed so that the air compressor assembly 850 may be controlled from outside by an operator.

[0030] As shown in FIGS. 5 through 8, exemplary air compressor assemblies according to the present invention have a shroud that encloses the unpainted air tank, the air compressor, and the tubing and piping. In these embodiments, since the air tank is enclosed in the shroud and thus hidden from an outside viewer, the air tank need not be painted during the manufacturing process. Moreover, since the air compressor and the tubing or piping are also enclosed in the shroud, the operator is thus not in direct contact with the potentially hot tubing or piping surfaces. Therefore, the risk of operator burn injuries during air usage from the potentially hot tubing or piping surfaces may be reduced. Furthermore, the air tank may warm up more quickly than an exposed tank by absorbing heat from the air compressor and the tubing or piping. The air tank also retains heat longer because of reduced convection and radiation cooling to the outside air. By keeping the air tank warmer, the moisture within the compressed air in the air tank is less likely to condense, resulting in reduced tank corrosion.

[0031] It is understood that the shroud of the air compressor assembly in accordance with the present invention may also enclose the unpainted air tank only (e.g., neither the air compressor nor the piping or tubing is enclosed) without departing from the scope and spirit of the present invention. It is also understood that the air compressor assembly according to the present invention may also have air tanks of other configurations. For example, it may have two horizontally disposed cylindrical compressed air tanks, positioned side by side in a vertically oriented "double hot-dog" configuration.

[0032] It is also understood that the specific order or hierarchy of steps in the methods disclosed are examples of exemplary approaches. Based upon design preferences, it is understood that the specific order or hierarchy of steps in the method can be rearranged while remaining within the scope of the present invention. The accompanying method claims present elements of the various steps in a sample order, and are not meant to be limited to the specific order or hierarchy presented.

[0033] It is believed that the present invention and many of its attendant advantages will be understood by the foregoing description. It is also believed that it will be apparent that various changes may be made in the form, construction and arrangement of the components thereof without departing from the scope and spirit of the invention or without sacrificing all of its material advantages. The form herein before described being merely an explanatory embodiment thereof, it is the intention of the following claims to encompass and include such changes.